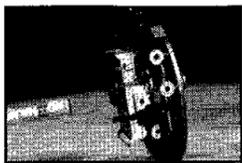




National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
Houston, Texas



Rendezvous record

STS-80 sets record for duration and multiple orbiting spacecraft. Photos on Page 3.



Dress rehearsal

The STS-81 crew was in Florida this week for the Terminal Countdown Demonstration Test. Story on Page 4.

Space News Roundup

Vol. 34

December 20, 1996

No. 49



*Seasons
Greetings*

*from the
Director*

This has been a very active and successful year for the center and a year that brought new programmatic responsibilities for the Space Shuttle and Space Station Programs, as well as Extra Vehicular Activities and consolidated Space Operations.

While assessing our new roles, we flew seven very successful shuttle missions. These missions have demonstrated our ability to fly safely, accomplish excellent science, and develop the technologies and operational techniques necessary to build the International Space Station. Several missions demonstrated the growing international involvement in our programs, a necessary component of our future plans. The announcement in December of the STS-86 crew, which includes members from France and Russia, highlights our commitment to a space program that reaches beyond our nation's borders. We also have started the transition of Space Operations over to private enterprise with United Space Alliance assumption of these responsibilities in October.

We also are making significant strides in realizing our goals of building the International Space Station. Despite a number of technical and managerial challenges, with hard work and dedication of all the people involved in the program, we have made great progress. Our favorable Phase 1 activities are providing the foundation necessary to attain our space station goals. Shannon Lucid's flight with her Russian colleagues is great testimony to our progress and started a succession of missions that has established an American permanent presence in Earth's orbit.

We are working on a new space vehicle—the X-38—which will be our first new piloted spacecraft since the shuttle. We're establishing a Biomedical Research Institute, that will allow us to partner with others in conducting the human life science research necessary to conduct long-term space flight.

The news this year of the discovery of possible signs of life in a Mars meteorite by research scientists here at JSC has sparked the imagination of people around the world. Our collection of asteroid and lunar samples and meteorites has brought renewed attention to JSC as the center for research that will lead to a better understanding of the universe we live in.

This year we have made significant progress in reaching out to the community. Our Open House and Inspection efforts were very well done, and very well received. The "Longhorn Project"—a cooperative effort with the Clear Creek Independent School District, the Texas Department of Agriculture, and Texas Longhorn breeders—will bring together the space program and agriculture and farming interests in an unprecedented partnership. Our new Emergency Operations Center, which will further add to our ability to provide a safe

Please see **DIRECTOR**, Page 4

JSC

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday. For more information, call x35350 or x30990.

EAA New Year's Dinner Dance: Dec. 31 at the Gilruth. Tickets cost \$27.50. Sales end Dec. 27.

Loving Feelings Concert: Johnny Rivers 8 p.m. Feb. 8 at the Arena Theater. Tickets cost \$34.50.

EAA Spring Break Special to Rome: March 8-15, \$1,099 double occupancy. \$200 deposit required. Final payment due Jan. 8.

Space Center Houston: Adult \$8.75; children (4-11) \$6.25, annual membership \$25.95, family membership (up to four) \$59.95.

Movie discounts: General Cinema, \$4.75; AMC Theater, \$4.50; Sony Loew's Theater, \$4.75.

Franklin Planner refills: now taking orders for 1997 calendars.

Stamps: Book of 20, \$6.40.

Entertainment '97 books: Cost is \$25.

Gold C Books: Cost is \$10.

"Orbit": The book "Orbit" by Jay Apt, Mike Helfert and Justin Wilkinson is on sale for \$28.

Metro tickets: Passes, books and single tickets available.

JSC

Gilruth Center News

Sign up policy: All classes and athletic activities are first come, first served. Sign up in person at the Gilruth Center and show a NASA badge or yellow EAA dependent badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

EAA badges: Dependents and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 8 a.m.-4 p.m. Saturdays. Cost is \$5. Dependents must be between 16 and 23 years old.

Hatha Yoga: A stress relieving, stretching and breathing exercise routine to unite body, mind and spirit. Classes meet from 5:30-6:30 p.m. Thursdays. Cost is \$35 for eight weeks.

Nutrition intervention program: A six-week program to learn more about the role diet and nutrition plays in health, including lectures, private consultations with a dietitian and blood analysis. Program is open to all employees, contractors and spouses. For more information call Tammie Shaw at x32980.

Defensive driving: One-day course is offered once a month. Pre-registration required. Cost is \$25.

Stamp club: Meets at 7 p.m. every second and fourth Monday in Rm. 216.

Weight safety: Required courses for employees wishing to use the weight room will be offered from 8-9:30 p.m. Jan. 14 and 28. Pre-registration is required. Cost is \$5.

Exercise: Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for six weeks.

Aikido: Martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. Cost is \$35 per month. New classes begin the first of each month.

Aerobics: Classes meet from 5:15-6:15 p.m. Tuesdays and Thursdays. Cost is \$32 for eight weeks.

Ballroom dancing: Beginner classes meet from 7-8:15 p.m. Thursdays. Advanced classes and classes for beginner-intermediate and intermediate meet from 8:15-9:30 p.m. Cost is \$60 per couple.

Country and Western dancing: Beginner class meets 7-8:30 p.m. Monday. Advance class meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

Fitness program: Health Related Fitness Program includes a medical examination screening and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

JSC

Swap Shop ads are accepted from current and retired NASA civil service employees and on-site contractor employees. Each ad must be submitted on a separate full-sized, revised JSC Form 1452. Deadline is 5 p.m. every Friday, two weeks before the desired date of publication. Ads may be run only once. Send ads to Roundup Swap Shop, Code AP2, or deliver them to the deposite box outside Rm. 181 in Bldg. 2. No phone or fax ads accepted.

Property

Lease: Cloisters, 2-story condo, 1-1.5, FPL, W/D, fans, reserved carport, enclosed patio, sec gates, pool, free cable, \$545 mo. 212-1377 or 281-486-0513.

Sale: Brook Forest, 4-2-2, 2348 sq ft, new carpet/tile, remodeled kitchen, middle atrium. Brian, 480-4351.

Rent: Sage Glen community, 4-2-2, formal living room/dining room, FPL, no pets, \$850 mo. 282-3229 or 286-4547.

Sale/Lease: University Trace condo 2-2.5, dining room, 2 covered parking, W/D, new refrig, \$675 mo/\$47.9k. 280-0991.

Sale: El Dorado Way condo, 2-2, refrig, W/D, covered parking, wet bar, ceiling fans, \$39k obo. 480-8381.

Sale: Brittany Bay, League City, 3-2-2, ex neighborhood, \$82k. David, x38122 or 338-8783.

Lease: East Seabrook, 1-1 upstairs apt, attic storage, avail 1/1/97, \$480 mo + \$200 sec. 281-474-2523.

Lease: Clear Lake City, 1 bedroom, FPL, W/D, appliances, new carpet, fresh paint, ceiling fans. Jim Briley, 244-4632 or 488-7901.

Rent: Meadowgreen, Clear Lake, 4-2-2, W/D avail, both formal, cul-de-sac lot, \$1k mo. 244-1082 or 480-5026.

Rent: League City, 2-1, new central air/heat, D/W, spa, \$600 + deposit, bills pd. Bill, 332-3649.

Sale: Nassau Bay/Queen's Court townhouse, 3-2.5-2, \$87.5k. 333-4286.

Sale/Lease: Egret Bay condo, 1-1-carport, appliances, new carpet, avail now. \$450 mo/\$29.9k. Terry, x36762 or 339-2306.

Lease: Middlebrook, 3-2-2, formal living room/dining room, fans, good cond, \$900 mo + dep. 281-486-8551.

Rent: Beach house, West Galveston, Jamaica Beach, 2nd row on beach, all amenities, sleeps 7, winter rates. 488-6796.

Rent: Arkansas cottage, wooded, overlooking Blue Mountain Lake and Mount Magazine, furn, massive FPL, antiques, view, \$50/dly or \$250/wkly. Corcoran, x47806 or 334-7531.

Rent: Winter Park, CO, condo, near ski area, 2-2, furn, hot tub, pool, sleeps 6. 488-4453.

Cars & Trucks

'81 Mercedes 380 SL, convert, 2 tops, 100k mi, recently painted, baby blue, ex cond, \$13.9k.

334-4666 or 281-344-2205.

'93 Ford Ranger XLT, std, 5 spd, A/C, AM/FM/cass, white exterior, ex cond, sliding rear window, \$5.9k. 409-925-4244.

'94 Chevy Extended Astro van, Tiarna conversion, 7 passenger seating w/4 capt chairs, P/W, P/L, ABS, front/rear A/C, \$14.2k obo. x34842 or 474-7982.

'92 Jeep Cherokee Sport 4 dr, 2 WD, collar, auto-O/D, tilt, cruise, A/C, cass, new battery, black/gray, \$39k mi, ex cond, \$12,775 obo. Dan, x4640 or 482-7550.

'95 Ford Probe GT, 14k mi, CD, ABS, 2 A/C, loaded, ex cond, \$15k. Tom, x49008 or 286-6561.

'88 Plymouth Grand Voyager, all options, rear air, 99k mi, \$3.9k. x47326 or 486-9673.

'89 Chevy Beretta 2.8, V6, cruise/tilt, great school/work car, \$3.5k obo. Angie, 244-5408 or 337-1311.

'94 Hyundai Elantra GLS, 4 dr, blue/green, tan inter, auto, P/L, P/W, AM/FM/cass, moonroof, 1 owner, good cond. x30211.

'93 GEO Metro, maroon, 3 cyl, 4 dr, good gas mileage, \$5.2k or \$177 mo. 489-8759.

'89 Olds Royale Brougham 88, 4 dr, maroon, climate control, AM/FM/cass, P/L, P/W, 92k mi, ex cond. 282-2045.

'84 Mazda RX7, 131k mi, clean, new AM/FM/cass, new brakes, \$18k. 281-486-8551.

Boats & Planes

'78 Cessna C182Q, 2k total time, 1285 SFRM, 50 SPOH, \$57k. George Gould, 409-938-0214.

Cycles

'83 Yamaha DT-1000 Enduro, purchased new in '88. 1.3k mi, new tires, ex cond, \$800. Rusty, 212-1450 or 481-5498.

'96 Harley Davidson, Sportster Huggler less 1k mi, extra chrome and windshield, garage kept, ex cond, priced to sell quick. 244-1791 or 488-1326.

Audio Visual & Computers

486/33 4 Mb RAM, 120 Mb HD, moden, 3.5 and 5.25 floppies, +28 14" SVGA monitor, \$500 obo. 996-0152.

Packard Bell 286 PC, 1 Mb RAM, 40 Mb HD, gameport, joystick, mouse, software, VGA monitor, Panasonic dot matrix printer, \$200 obo; IBM PC jr, 256 RAM, cordless keyboard, monitor, software, \$75. Steve, 480-6415.

Mac LCII 8 Mb RAM w/accelerator chip, NEC Multisync 3Fpx 14" color monitor, extended keyboard, mouse, US Robotics, 14.4 KBS fax/modem, plus associated software, make offer on any or all. Grant, 333-6449 or 480-5853.

Brother electronic typewriter, working cond, \$10. x30737.

Compaq computers, 1 PC-server 486/66 12 Mb RAM, 240 Mb HD, keyboard, no monitor, \$700 obo; 1 Deskpro 486 4Mb RAM/240 Mb HD w/many interface cards, keyboard, no monitor,

JSC

Dates & Data

Today

Toys for Tots: Today is the last day to contribute to the Toys for Tots program in the Bldg. 3 cafeteria.

Cafeteria menu: Special: tuna noodle casserole. Total Health: broiled chicken breast. Entrees: deviled crabs, broiled pollock, liver and onions, broiled chicken with peach half, Reuben sandwich. Soup: sea-food gumbo. Vegetables: Italian green beans, cauliflower au gratin, steamed rice, vegetable sticks.

Monday

Cafeteria menu: Special: Italian outlet. Total Health: herb flavored steamed pollock. Entrees: barbecue beef spare ribs, steamed pollock, baked chicken. French dip sandwich. Soup: black bean and rice. Vegetables: California mix, okra and tomatoes, vegetable sticks, ranch style beans.

Tuesday

Cafeteria menu: Special: spaghetti with meatballs. Total Health: baked potato. Entrees: stir fry beef, liver and onions, beef cannelloni, ham steak French dip sandwich. Soup: split pea. Vegetables: winter blend mix, seasoned cabbage, breaded squash, lima beans.

Wednesday

Christmas holiday:

Most JSC offices will be closed Dec. 25 for the Christmas holiday.

Thursday

Radio club meets: The JSC Amateur Radio Club will meet at 7 p.m. Dec. 26 at the Nassau Bay City Hall Bldg. For more information call Larry Dietrich at x39198.

Cafeteria menu: Special: chicken fried steak. Total Health: roast beef with gravy. Entrees: steamed pollock, lasagna with meat, steamed

pollock, catfish, French dip sandwich. Soup: cream of turkey. Vegetables: whole green beans, butter squash, cut corn, black-eyed peas.

Friday

Cafeteria menu: Special: fried chicken. Total Health: vegetable lasagna. Entrees: pollock hollandaise, beef stroganoff, vegetable lasagna. Vegetables: steamed broccoli, carrots vichy, Italian zucchini, breaded okra.

Dec. 31

New Year's dance: The Employee Activities Association will host a New Year's Dinner Dance at 7:30 p.m. Dec. 31 at the Gilruth Center. Tickets cost \$27.50 and include dinner, party favors and a champagne toast at midnight. Ticket sales end at 3 p.m. Dec. 27. For more information call Mavis Ilkenhans at x49644.

Jan. 1

New Year's Day: Most JSC offices will be closed for the New Year's holiday.

Jan. 2

Warning system test: The site-wide Employee Warning System will undergo its monthly audio test at noon Jan. 2. For more information call Bob Gaffney at x34249.

Jan. 7

ABWA meets: The American Business Women's Association, Clear Lake Area Chapter will meet at 5:30 p.m. Jan. 7 at Bay Oaks Country Club. For more information call Kathleen Kaminski at x38706.

Jan. 8

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Jan. 8 at the House of Prayer Lutheran Church. For

more information call Jeannette Kirinich at x45752.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Jan. 8 at the United Space Alliance in the Civic Room at 600 Gemini. For more information call Pat Blackwell at 282-4302 or Ben Black at 282-4166.

Astronomy seminar: The JSC Astronomy Seminar will be held at noon Jan. 8 in Bldg. 31 Rm. 129. An open discussion meeting is planned. For more information call Al Jackson at x35037.

PSI meets: The Clear Lake/NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. Jan. 8 at the Holiday Inn, NASA Road 1. Dinner costs \$12. For details call Elaine Kemp at x30556.

Jan. 10

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. Jan. 10 at the Lunar and Planetary Institute, 3600 Bay Area Blvd. For more information call Chuck Shaw at x35416.

Jan. 15

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Jan. 15 at the House of Prayer Lutheran Church. For more information call Jeannette Kirinich at x45752.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Jan. 15 at the United Space Alliance in the Civic Room at 600 Gemini. For more information call Pat Blackwell at 282-4302 or Ben Black at 282-4166.

Astronomy seminar: The JSC Astronomy Seminar will be held at noon Jan. 15 in Bldg. 31 Rm. 129. An open discussion meeting is planned. For more information call Al Jackson at x35037.

Swap Shop

\$400 obo. x32920 or 992-9203.

Two electric typewriters, \$40 ea. David, x47080.

Macintosh computer modem 2400 Global Village, \$20; Kenwood dual cassette deck, ex cond, \$85. Bob, x33149.

Musical Instruments

Martin guitar, model d-12-26 w/ hard case, \$900 obo. Steve, x33565.

Banjo 5 string w/Tone Ring, \$450; Classical guitar, \$150. 282-4592 or 455-5957.

Pets & Livestock

Free 3yr, small grey DSH kitty w/great personality, spayed, yard/house trained, access included, restationed unable to take with us. Edna, x34322 or 281-452-0731.

Mini-Rex rabbits, \$10 ea. 482-0874.

Jungle Carpet Pythons, captive born '96, black and yellow, Australian species, 6' max adult size, \$250 ea or \$450 pr. x34565 or 333-6415.

Two Ferrets, female, spayed, declawed, 1 yr old, 2 cages and access, \$200 pr. Steve, 333-6834 or 286-9802.

Two 16" Red Tailed Boas w/aquarium, vita light and hot rock, \$300 obo. 488-1785.

Sale/Trade female Military Macaw, 1 yr old, hand tame, beginning to talk, lg cage, paid \$1.5k make offer. 282-9929.

Longhorn calves, 7 mos, registered, \$600-\$800; steers, \$225. x38170 or 409-925-6272.

AKC Reg Rottweiler puppies, ready 1st week of Dec., tails and due claws have been docked, \$300. Daisy, 280-8383 or 409-925-2944.

Household

King size oak bedroom set, waterbed converted to mattress, can be used either way, lg double mirror, dresser, mirrored headboard, ex cond, \$600 obo. Kathi, x38674 or 332-2650.

Refrigerator/freezer, 22 cu ft, auto ice maker, good cond, \$300. x36093 or 480-6350.

Couch, 70 yr old antique, good cond, \$60; solid walnut and oak banker's reference table, 34 x 60 w/2 drawers, \$150. 280-1209 or 332-0007.

Custom 8'x8' oak computer desk w/6 4" book shelves, \$700; heavy duty Kenmore washer and dryer, \$350 ea; large microwave w/turn table, \$125, all in ex cond. x45507 or 486-5745.

Custom 7'x4.5 sided oak bookcase, \$450; antique hutch w/French doors, \$100; full length couch, \$100; matching dresser, chest of drawers, headboard, night stand, \$450, all ex cond. x45507 or 486-5745.

Large beige couch, \$125; computer desk, \$50; kitchen table, round w/2 chairs, \$50; lg microwave, \$30; dual cassette deck, \$25; AM/FM/TV stereo tuner, \$75. Steve, 480-6415.

Family room furniture, couch, chaise, recliner, table, \$400; kitchen table w/4 chairs, \$150; washer/dryer, \$400. 244-1082 or 480-5026.

Matching couch and loveseat w/2 chairs, \$250; 1 white Lazyboy couch, \$200; refrigerator w/top freezer, \$75. 286-1601.

Four piece brown sectional couch w/chaise, \$225; king size bed frame, \$35; tile-top kitchen table w/4 chairs, \$125. David, x47080.

Large walnut coffee table, 44" dia, \$90; 2 round wicker barrel chairs w/small table, \$40. 488-4453.

Hoover Upright vacuum cleaner rated at 12.5 amps, ex cond, \$35. 486-7229.

Wanted

Want vanpool riders from Sugar Land, Southwest Houston for NASA and contractors site. Alice, x35234.

Want car-pooler(s) near N/W Houston, 610/290 to NASA/JSC, M-F 8 am - 4:30 pm. x41290 or 713-688-5532.

Want personnel to join VPSI vanpool departing South Braeswood Park and Ride lot at 6:50 a.m. for JSC and offsite locations, 7:30 - 4:30 shift. Susan Gaylor, 282-5447 or Al Rudder, x34997.

Want Personnel to join VPSI Vanpool departing Meyerland Park and Ride lot at 7:05 a.m. for JSC, shift 8 a.m. - 4:30 p.m. Don Pipins, x35346.

Want non-smoking female to share house in Clear Lake Shores, 1 block to lake, deck, garage, security system, references required, \$550 mo obo including utilities, except phone. 280-3991 x424.

Want roommate, 3-2-2, Pasadena, smoker OK, \$350 mo. Tamela, x36155 or 998-8859.

Want electric guitar w/amp for \$250 max. 482-0874.

Want experienced partner for intermediate or advanced ballroom dance lessons at Gilruth Ctr. George, x33667 or 992-4089.

Want referral/s for good quality/reasonable cost landscape sprinkler system installation company. Helen, x38413 or 997-6141.

Want Super NES. Steve, x35145.

Want 20 Ga/12Ga over and under shotgun for wife's skeet and trap shooting. x41290 or 281-244-1290.

Want 2 swing sets, Susan, x30626 or 479-5594.

Want washer. Susan, x30626 or 479-5594.

Miscellaneous

Health Rider, ex cond, \$350. Ines, 244-2205.

Ammo, 15-06, \$9 per box; 7 Rem Mag, \$12 per box; 38 special or 9mm, \$6.50 per box. Charles, 661-4789.

Beretta model 92F, 9mm semi-auto w/case, cleaning kit, \$400. Steve, x33565.

Stock tank, 9' dia, obo; W/D, working, \$100 both. 482-0874.

Slant exercise board, \$20; Swing Trainer w/video, \$100 obo. 488-4453.

Security Lite, crime deterrent, w/electric eye, ex cond, \$35; ladies 3 spd bicycle, Raleigh,

\$150. 281-333-2335.

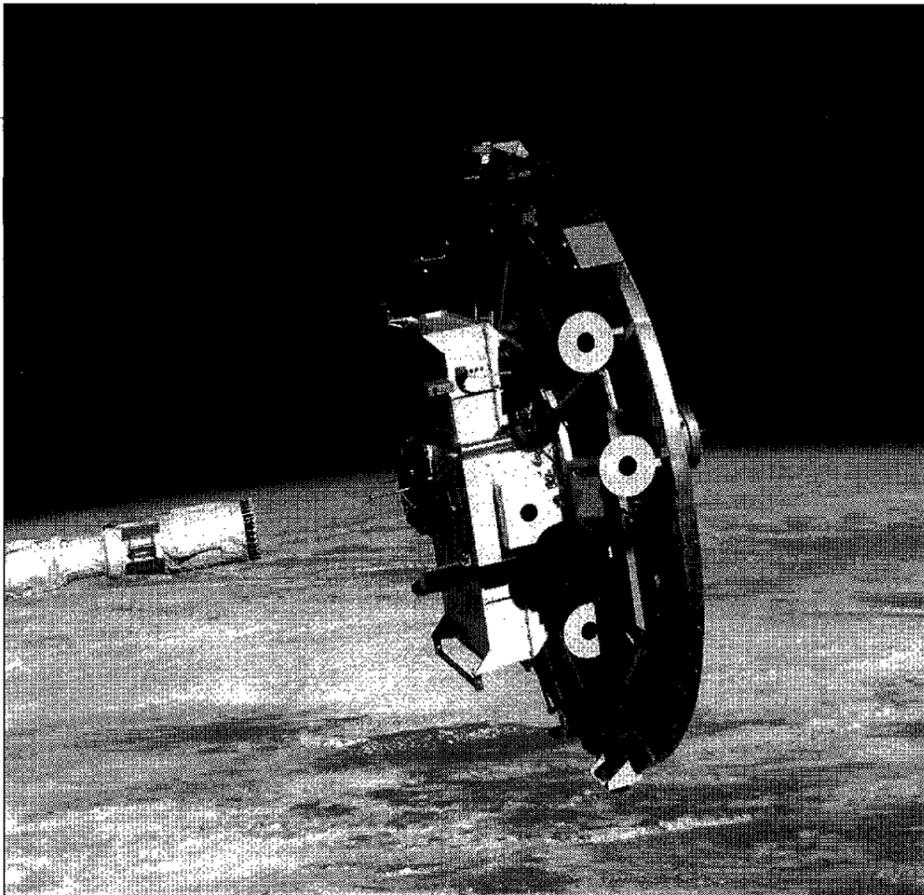
Go-Cart, Briggs and Statton engine, 1 yr old, still under warranty, \$600 obo. 489-8759.

'76 Cent Golden-trigger Marlin 30-30 w/ Bushnell scope, case, etc, ex cond, \$500. Chris, x31599 or 992-1608.

Dog house, large, ventilated, ex cond, new \$90 sell \$40. 486-7229.

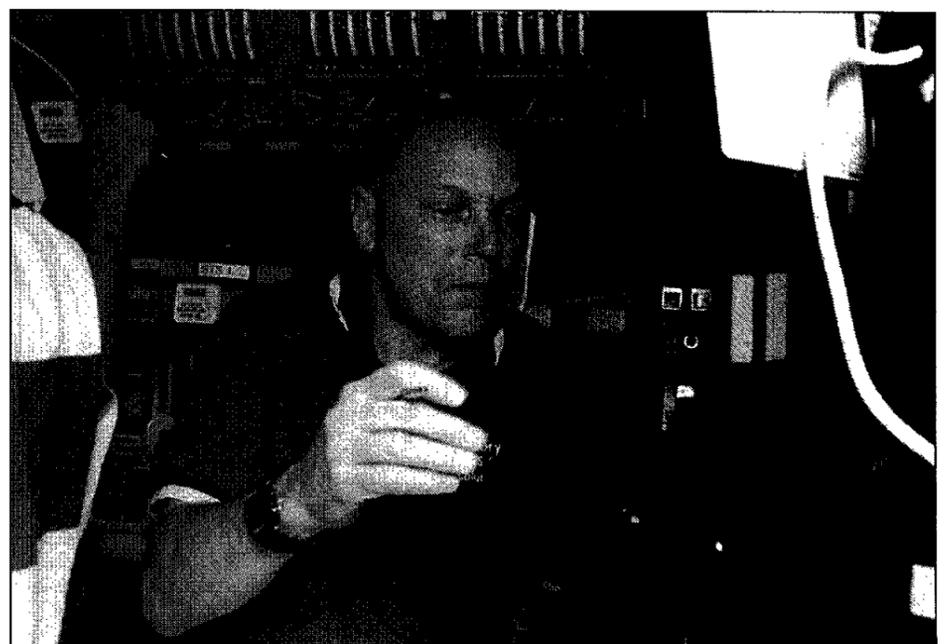
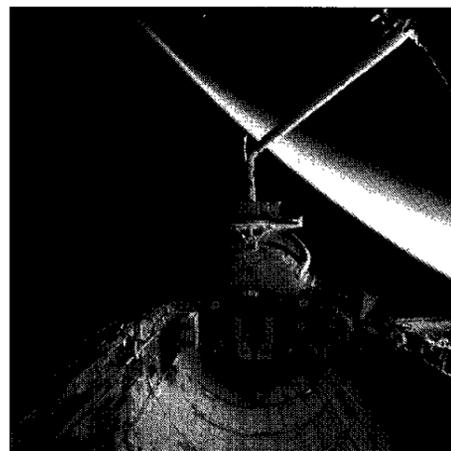
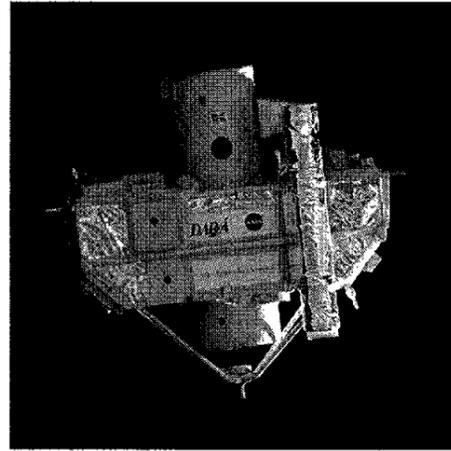
NordicTrack Achiever exercise machine w/full instrumentation, pulse monitor, ex cond, \$300. x38586 or 728-1877.

Heathkit mr-1010 radio



3-Body Solution

STS-80 mission enters history books as longest flight, first to deploy, retrieve two satellites



The STS-80 mission enters the record books as the longest shuttle flight and the first to deploy and retrieve two satellites, solving the 3-body orbital mechanics problem.

With a touchdown at 5:49 a.m. CST Dec. 7, STS-80 enters the record books as the longest shuttle flight in history. *Columbia's* 17 day, 15 hour and 53 minute flight surpassed the previous record set by STS-78 in July.

STS-80 also was the first flight to deploy and retrieve two satellites. Commander Ken Cockrell, Pilot Kent Rominger and Mission Specialists Tammy Jernigan, Tom Jones and Story Musgrave successfully deployed and retrieved both the ORFEUS-SPAS and Wake Shield Facility satellites, bringing scientists more data than expected.

Mission managers gave astronauts an extra day to collect data from the ultraviolet astronomy satellite before the crew plucked ORFEUS-SPAS from its orbit and placed it back in *Columbia's* cargo bay. Wake Shield scientists reported the maximum seven thin film growths of semiconductor material were completed during the three days the satellite flew free of *Columbia* surpassing its major objectives for the mission. The materials were grown in an ultravacuum 100 to 1,000 better than any seen on Earth. The satellite also was perched atop *Columbia's* robot arm for about six hours as scientists gathered data on using atomic oxygen in low orbit to grow aluminum oxide films.

Through it all the crew collected photos to share. From top to bottom, left to right;

- 1) Jones uses the controls of *Columbia's* Remote Manipulator System to conduct a test with the captured Wake Shield Facility, seen through window;
- 2) Cockrell steers *Columbia* from the aft flight deck during rendezvous operations with the Wake Shield Facility;
- 3) The Orbiting Retrievable Far and Extreme Ultraviolet Spectrometer-Shuttle Pallet Satellite, or ORFEUS-SPAS, appears suspended in space during approach by *Columbia*;
- 4) Jernigan uses a laser ranging device during *Columbia's* rendezvous operations with the ORFEUS-SPAS;
- 5) The STS-80 crew captures on film the release of the Wake Shield Facility.
- 6) Using the Remote Manipulator System, the crew berths the Wake Shield Facility;
- 7) Rominger occupies the commander's station aboard *Columbia* during station keeping operations with ORFEUS-SPAS. Earth, some 190 nautical miles away, appears just beyond arm's length on *Columbia* port side;
- 8) Musgrave works with a pair of computers dedicated to Wake Shield Facility operations onboard *Columbia's* flight deck. □

Mir crew conducts space walks, harvests wheat

Cosmonaut Researcher John Blaha and his Mir 22 crewmates have spent the past two weeks conducting the first two space walks of the mission and harvesting the first crop of healthy plants grown on orbit.

In the six-and-one-half-hour space walk performed last Monday, Commander Valery Korzun and Flight Engineer Alexander "Sasha" Kaleri finished installing the cooperative solar array to the exterior of the Kvant-1 module to boost the Mir's electrical generation capacity. The space walk completed work begun the previous week. The two cosmonauts also installed a navigation antenna to the station's docking module to aid future dockings of Progress re-supply vehicles.

Blaha described some of the activity as he downlinked video to the Russian mission control center this week.

"Another thing Valeri and Sasha did on this EVA was they repaired our transceiver system that we use to talk to amateur operators all around the world," Blaha said. "They had quite a bit of equipment they were trying to move, and I was very impressed with all their

work. They lived in those suits for nine hours and did a fantastic job. We had a lot of good work that day and I look forward to working with them here for another month yet."

Blaha monitored the space walks from inside the station as Korzun and Kaleri did their work outside. In an interview last week, Blaha was asked if he felt any envy about not getting to walk in space himself.

"It's something that at one time I really wanted to do, but when I was involved with the shuttle as the pilot and commander we're not allowed to do that. In (the shuttle/Mir) program we are, and on the next mission ... Jerry Linenger will participate in a space walk with a Russian cosmonaut, so that will be quite an event."

Regarding the harvest of plants grown through a complete life cycle, Blaha pointed out that, in space, the near absence of gravity means there is one less thing affecting the way plants grow, thus allowing for a more controlled experiment. Scientists can

study other factors such as light, temperature and nutrients in order to learn how each of those elements influence plants without the presence of gravity.

In "Project Greenhouse," 32 plants of a super-dwarf wheat variety were harvested as part of a joint cooperative initiative with NASA; Utah State University, Logan, Utah; the Institute of Biomedical Problems Research Center in Moscow; and the Space Research Institute of the Bulgarian Academy of Sciences in Sofia. Unlike previous short-term experiments, these plants were allowed to develop at a normal growth rate and appear to have matured fully to produce the desired seed-containing heads, project scientists report.

"The development of plant-based, regenerative life support systems is critical to sustaining a crew during long-duration missions such as Mars exploration," said David Bubenheim, project co-investigator at NASA's Ames Research Center.



BLAHA

Flight dynamics hangs STS-80 plaque in MCC

The Flight Dynamics team was given the honor of hanging the STS-80 plaque in Mission Control after executing the first NASA mission involving tracking and rendezvous of three separately orbiting spacecraft.

Two individuals were awarded the traditional honor of climbing the ladder and hanging the plaque. Bill Britz, the lead Flight Dynamics Officer, shared the honors of hanging the plaque with Matt Abbot, the Ascent Flight Dynamics Officer.

"Britz and his team demonstrated leadership and innovation in new software tools development," said Lead Flight Director Al Pennington. "Abbot and his team demonstrated technical excellence, and a coolness during crisis."

Britz and his team developed and executed a new flight profile. The team successfully completed the first NASA mission involving three spacecraft, the Space Shuttle *Columbia*, the Wake Shield Facility and ORFEUS-SPAS, in close proximity to each other. Abbot and his team executed a complete reconfiguration of all the Flight Dynamics Officer ascent trajectory monitoring after a software malfunction thus averting a hold in the STS-80 countdown.



JSC Photo

TOYS FOR TOTS—From left, Astronaut Rick Sturckow, JSC Director George Abbey, Staff Sgt. Rebecca Chandler and Lance Cpl. Luis Fuhlbrigge kick off JSC's participation in the U.S. Marines "Toys for Tots" program in Bldg. 3 last Friday. In addition, Dyncorp, the aircraft, maintenance and modification contractor at Ellington Field, sold tickets to their company Christmas party. The money raised was used to purchase toys for the Toys for Tots program. Last Friday, employees went to purchase their toys at the Venture store. The store is currently promoting free merchandise to every 50th customer in line and Dyncorp was rewarded with that honor. Employees were able to purchase double the amount of toys originally planned. Employees may donate unwrapped toys in Bldg. 3 through today.

Eva joins Space Center team in status center

Her name is Eva and she welcomes visitors to Space Center Houston's Mission Status Center with blinking eyes and lighted fiber optic hair.

The newest addition to SCH, unveiled to the public last month, stands 5'8" tall and is the latest in human-like robotics. Her 26 robotic functions make her a "showbot" of the status center.

"Eva should entice everyone to dream about how telecommunications can bring our worlds closer together," said Mike Turner, regional president of Southwestern Bell and sponsor of the status center. "We hope that visitors to our exhibit will find Eva informative and entertaining and that they'll learn more about how cutting-edge technology and space exploration can shape their future."

Turner, along with SCH General Manager Richard Allen and board members Benard Harris and Joe Bailey, cut the ribbon last month to officially open Eva to guests of SCH. During the event, a special message was relayed to guest gathered for the ribbon-cutting ceremony.

"The entire STS-80 crew extends its greetings to everyone gathered at Space Center Houston to welcome Eva to the planet Earth," said Commander Ken Cockrell from low-Earth orbit. "From what we hear, Eva will have a lot to teach us about the future and the wonders of cutting-edge communications."

Eva was named after her particular role in space technology. Robots will be an integral part of the building of the International Space Station and the majority of work will be done as Extravehicular Activity, or EVA.

Eva's role at the status center is to welcome guest to her world. She describes how telecommunications has developed during the 21st century and emphasizes points by movements of hands, fingers, even raising her eyebrow now and then. Her introduction leads visitors into the real world of space where they are given a behind-the-scenes look at the current space program and what is happening minute by minute.



Eva the newest addition to Space Center Houston's Mission Status Center greets guests with blinking eyes and lighted fiber optic hair.

Crew completes launch countdown dress rehearsal

By James Hartsfield

Preparations of *Atlantis* for STS-81, the first flight of 1997 and the fifth Mir docking mission, remained on schedule this week as the crew and launch controllers completed a dress rehearsal countdown.

The STS-81 crew—Commander Mike Baker; Pilot Brent Jett; Mission Specialists John Grunsfeld, Marsha Ivins, Jeff Wisoff and Jerry Linenger, who will assume duties aboard the Russian station, relieving John Blaha—completed the practice countdown Tuesday. Meanwhile, technicians continued corrective work on actuators for the six hatches aboard *Atlantis*, with all of the actuators planned to be reinstalled in the shuttle by early next week. Technicians are replacing screws in the mechanisms and applying an adhesive to prevent any problems similar to the jammed hatch on STS-80. All work remains targeted toward a launch of STS-81 as early as Jan. 12.

Milestones for *Atlantis*, currently at Launch Pad 39B, include closing the payload bay doors for flight on Jan. 2. Shuttle managers will meet for a final flight readiness review on Jan. 6, following which an official launch date will be announced.

Elsewhere, *Discovery*, in the Bay 2 processing hangar, continued preparations for a launch of STS-82, the second Hubble Space Telescope servicing mission, in mid-February 1997.

Technicians are removing the hatch actuators from *Discovery* this week for corrective work as well. The payload bay doors are scheduled to be closed for the holidays this weekend. *Discovery* is scheduled to be moved to the Vehicle Assembly Bldg. to be hoisted vertical and mated with the STS-82 solid rockets and fuel tank on Jan. 8 and rolled to Pad 39A on Jan. 15.

Columbia is now being readied for a late March 1997 launch on STS-83 carrying the Microgravity Science Laboratory. This week, the shuttle's robotic arm was removed and the payload bay doors closed for the holidays.

Director praises employees' work

(Continued from Page 1)

work environment for our employees, has been opened to surrounding communities for their use during hurricanes, floods, and other emergencies. These efforts underscore our commitment to ensuring that people outside the center's perimeter fences can see what we're doing and better understand how our efforts benefit them.

In the midst of all we have accomplished, and all that is ahead of us, we also recognize that the environment in which we work is changing. The country is in the process of re-examining its priorities. Congress and the Administration are searching for new ways to further reduce the size of government and to trim the budget. NASA and the Johnson Space Center are not exempt—we have already felt many of the effects, and there are more ahead.

We should all take pride in our accomplishments this year, but we also must remember that we have many challenges and opportunities ahead of us. The future will demand the best we have to offer and will challenge us in new and unexpected ways.

I thank you for your hard work and dedication, for your attention to details and for your "can do" spirit. My heartfelt wishes for a joyous holiday season are extended to each and everyone of you and your families.